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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,102	09/19/2006	Shin Nakamura	W1878.0239	4076

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DICKSTEIN SHAPIRO LLP
1633 Broadway
NEW YORK, NY 10019

EXAMINER	
ENIN-OKUT, EDU E	
ART UNIT	PAPER NUMBER
1727	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/599,102	NAKAMURA ET AL.	
	Examiner	Art Unit	
	Edu E. Enin-Okut	1727	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,7,8,14 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7,8,14 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

SOLID ELECTROLYTE FUEL CELL

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 14/, 2010 has been entered. Applicant has amended claim 1 and added claims 14 and 15. Claims 1, 7, 8, 14 and 15 are pending.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 103

4. Claims 1, 7, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ren et al. (US 2004/0209136) in view of Kinkelaar et al. (US 2004/0001991; hereinafter referred to as Kinkelaar '991) and Kinkelaar et al. (US 2004/0001993; hereinafter referred to as Kinkelaar '993).

Regarding claim 1, Ren teaches a solid electrolyte fuel cell (having a solid membrane electrolyte) (para. 24) comprising:

- layers of a fuel cell ("laminate") compressed to adhesion by bolts (122) (para. 45, lines 17-22; Figs. 1-4 and 8) of
- a methanol delivery film (209, 460, 860) ("limited fuel-permeating part") (para. 48, lines 24-27; para. 31; Figs. 2-4,8),
- an anode current collector (224, 424, 823) (para. 49,67,79; Figs. 2-4,8),
- a catalyzed membrane electrolyte (204, 404, 804) with an electrocatalyst coating on an anode face (206) ("anode catalyst layer"), a membrane electrolyte ("solid electrolyte membrane"), and an electrocatalyst coating on a cathode face (208) ("cathode catalyst layer") (para. 48; Figs. 2-4,8),
- a cathode current collector (226, 426, 836) (para. 49,67,79; Figs. 2-4,8),
- and a cathode filter (290, 480, 880) ("evaporation inhibiting layer") which limits cathode water evaporation rate (para. 59,85)
- in sequence (Figs. 2-4,8),
- wherein the cathode filter (290, 480, 880) ("evaporation inhibiting layer") which covers the surface of the cathode current collector (226, 426, 836) (para. 85-86; Figs. 2-4,8).

Ren teaches the cathode filter ("evaporation inhibiting layer") as an extra cathode backing layer which limits cathode water evaporation rate and curbs evaporative water loss (para. 58,82,85). Ren does not expressly teach that the cathode filter ("evaporation inhibiting layer") is made of woven or unwoven fabric containing fibrous cellulose.

Kinkelaar '991 teaches cathode backing layers/capillarity (32) structure made of woven or nonwoven fibers of cellulose (para. 16) that retains liquids, maintain effective gas diffusion, without adversely impacting fuel cell performance or adding significant expense (para. 11-12,14), these cathode backing layers/capillarity (32) are laminated outside of a foil current collector (36), and the current collector (36) is laminated to the cathode (18) of the PEM (12)

(para.1 07,111; Fig. 1). Kinkelaar '993 teaches that the materials used to form the cathode backing layers/capillarity (32) structure of Kinkelaar '991 can have a void volume ("porosity") that ranges from 65-97% (para. 32,54-59).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Kinkelaar '991's cathode back layers/capillarity structure made of woven or nonwoven fibers of cellulose, where material forming the structure has a porosity from 65-97% as described by Kinkelaar '993, as Ren et al.'s cathode filter ("evaporation inhibiting layer"), because both Kinkelaar '991 and Kinkelaar '993 teaches that it retains liquids, maintain effective gas diffusion, without adversely impacting fuel cell performance or adding significant expense (see Kinkelaar '991, para. 11-12,14; and, Kinkelaar '993, para. 8,32,36), and because Ren teaches the desire for the cathode filter to curb evaporative water loss (see Ren, para. 58, 82,85), thus retaining water. Further, as to the range of the porosity of the evaporation inhibiting layer recited in the claim, it has been held that obviousness exists where the claimed ranges overlap or lie inside ranges disclosed by the prior art (e.g., *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)); and, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See MPEP 2144.05 (I), (II).

Ren, Kinkelaar '991 and Kinkelaar '993 do not expressly teach that the evaporation inhibiting layer has a volume expansion coefficient of 4.5 or less and initiating water migration from the evaporation inhibiting layer to the cathode at a temperature of 80°C or lower. However, it is the position of the examiner that such properties are inherent, given that both Ren, as modified by Kinkelaar '991 and Kinkelaar '993, and the present application utilize the same material of woven or nonwoven fibers of cellulose with a similar porosity (see instant

application p. 12, lines 20-26; Examples 1 and 2). A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. *In re Robertson*, 49 USPQ2d 1949 (1999).

Regarding claim 7, Ren teaches a fuel reservoir (450, 850) ("container") reserving a neat methanol ("liquid fuel") supplied to an anode side is placed adjacently to the methanol delivery film (209, 460, 860) ("limited fuel-permeating part") (para. 48, lines 22-27; para. 68, lines 1-4; Figs. 2-4,8).

Regarding claims 14 and 15, Ren as modified by Kinkelaar '991 and Kinkelaar '993 teaches that the evaporation inhibiting layer has a thickness from 0.1 to 10 mm (100 to 10,000 μm) (see Kinkelaar '991, para. 115). It has been held that obviousness exists where the claimed ranges overlap or lie inside ranges disclosed by the prior art. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP 2144.05 (I).

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ren et al. (US 2004/0209136) in view of Kinkelaar et al. (US 2004/0001991; "Kinkelaar '991") and Kinkelaar et al. (US 2004/0001993; "Kinkelaar '993") as applied to claims 1, 7, 14 and 15 above, and further in view of Wilson (US 6,808,838).

Ren, Kinkelaar '991 and Kinkelaar '993 are applied and incorporated herein for the reasons above.

Regarding claim 8, Ren teaches the fuel reservoir (450, 850) ("container") reserving a neat methanol ("liquid fuel") supplied to an anode side is placed adjacently to the methanol delivery film (209, 460, 860) ("limited fuel-permeating part") (para. 48, lines 22-27; para. 68, lines 1-4; Figs. 2-4,8). Carbon dioxide ("gas generated by a cell reaction") being vented

between the anode diffusion layer (210) and the methanol delivery film (209, 460, 860) ("limited fuel-permeating part") by Fig. 2's arrow (234) ("gas discharging part which is not adjacent to the fuel-absorbing member for discharging"), the carbon dioxide ("gas generated by a cell reaction") travels next to the methanol delivery film (209, 460, 860) ("limited fuel-permeating part"). The methanol delivery film (209, 460, 860) ("limited fuel-permeating part") resists carbon dioxide from flowing back into the fuel chamber, so some of the carbon dioxide flows into ("in the limited fuel-permeating part") the methanol delivery film (209, 460, 860) ("limited fuel-permeating part"), but is kept from going into the fuel chamber, therefore directing the carbon dioxide back out according to Fig. 2's arrow (234) (para. 49, lines 15-18; para. 66; Figs. 2-4,8). A fuel reservoir (450, 850) placed adjacently to the methanol delivery film (209, 460, 860) ("limited fuel-permeating part") (para. 48, lines 22-27; para. 68, lines 1-4; Figs. 2-4,8). Ren desires to have the liquid methanol in the fuel reservoir (450, 850) to undergo a phase change to methanol vapor prior to introduction to anode (para. 68; Figs. 2-4,8).

Ren does not expressly teach a fuel-absorbing member being placed adjacently to a part of the methanol delivery film (209, 460, 860) ("limited fuel-permeating part") that absorbs the liquid fuel.

Wilson teaches a superabsorbent material (36) ("fuel-absorbing member") being placed within a fuel reservoir cavity (34) (6:12-40; Fig. 2B). The superabsorbent material (36) ("fuel-absorbing member") supplies phase changed methanol from neat liquid to vapor form, which limits methanol cross-over (4:57-62).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Wilson's superabsorbent material (36) ("fuel-absorbing member") to Ren's fuel reservoir (450, 850), because Wilson teaches that the superabsorbent material (36) ("fuel-absorbing member") supplies phase changed methanol, from neat liquid to vapor form, which

limits methanol cross-over (see Wilson, 4:57-62), and desired by Ren (see Ren, para. 68, Figs. 2-4,8).

Response to Arguments

6. Applicant's arguments filed on April 14, 2010 have been considered, but applicant has amended the claims such that new grounds of rejection were necessitated as presented above.

Conclusion

7. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Ren et al. (US 2004/0209154) teaches passive water management techniques in fuel cells.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Edu E. Enin-Okut** whose telephone number is **571-270-3075**. The examiner can normally be reached on Monday to Thursday, 7 a.m. - 3 p.m. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private

PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edu E. Enin-Okut/
Examiner, Art Unit 1727

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1727